Instructions: Complete each of the following on separate, stapled sheets of paper.

The Gradient (§14.6)

1. Compute the maximum rate of change of f at point P, and the direction in which it occurs.
   (a) $f(x, y) = 4y\sqrt{x}; \qquad P = (4, 1)$
   (b) $f(x, y, z) = x\ln(yz); \qquad P = (1, 2, \frac{1}{2})$
   (c) $f(x, y, z) = \arctan(xyz); \qquad P = (1, 2, 1)$